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## Introduction

- Endometrial cancer is the most common gynecologic cancer and is one of only a few cancers with a rising mortality rate. <sup>1</sup>
- Rural women often lack spatial access to gynecologic oncology services, which may put them at greater risk for endometrial cancer mortality. <sup>2-3</sup>
- Surgery, including lymph node examination, is necessary to stage endometrial cancer as clinical procedures are insufficient to determine disease extent and guide adjuvant therapy.
- There is a paucity of research on rural-urban differences in receipt of surgery, lymph node examination, and adequate lymphadenectomy among endometrial cancer patients.

## Methods

**Data:** We analyzed data on endometrial cancer patients diagnosed between 2004 and 2013 from the Surveillance Epidemiology and End Results (SEER) registries, which represents ~30% of the United States population (n=59,661).

### Demographic Variables:

- Rural-urban status, defined by Rural Urban Continuum Codes <sup>4</sup> (categorizes counties as rural or urban based on population size and proximity to urban area)
- Age, race/ethnicity, and marital status of endometrial cancer cases

### Clinical Variables:

- Endometrial cancer histology type (Type I, II, or other; Type II is more aggressive)
- Receipt of surgery (Yes/No)
- Examination of regional lymph nodes (Yes/No and # of lymph nodes)
- Receipt of adequate lymphadenectomy- defined as at least 10 lymph nodes examined <sup>5</sup> (Yes/No)

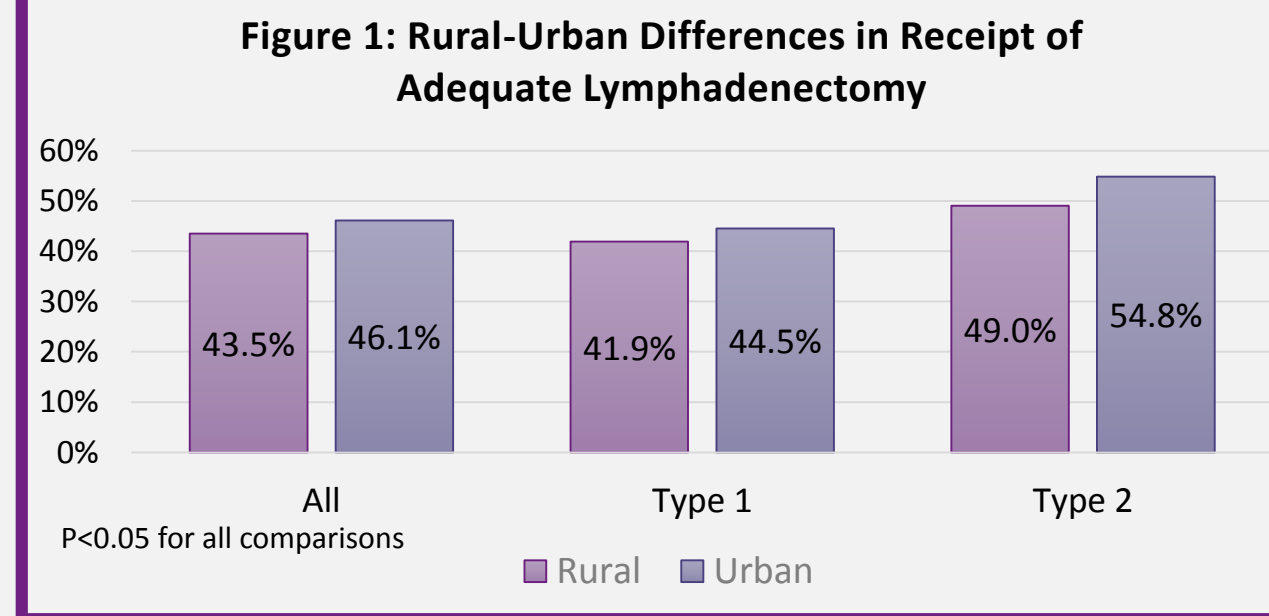
### Statistical Analysis:

- Univariate analysis to assess the relationship between rural-urban status and demographic/clinical characteristics, receipt of regional lymph node examination and adequate lymphadenectomy
- Cochrane-Armitage Test for trends in adequate lymphadenectomy
- Unadjusted and adjusted logistic regression to assess rural-urban differences in odds of receipt of surgery, lymph node examination, and adequate lymphadenectomy

## Results

**Table 1: Demographic Characteristics of Endometrial Cancer Patients**

	Rural (n=6,303)	Urban (n=53,358)	P-Value
<b>Race/Ethnicity</b>			
Non-Hispanic White	5,444 (86.4%)	37,299 (69.9%)	<0.001
Non-Hispanic Black	338 (5.4%)	4,564 (8.6%)	
Hispanic	210 (3.3%)	6,191 (11.6%)	
Non-Hispanic Asian American Indian	211 (3.6%) 100 (1.6%)	4,858 (9.1%) 446 (0.8%)	
<b>Age</b>			
<50	697 (11.1%)	6,303 (11.8%)	0.03
50-70	4,001 (63.5%)	34,167 (64.0%)	
71+	1,605 (25.5%)	12,888 (24.2%)	
<b>Marital Status</b>			
Married	3,589 (56.9%)	27,077 (50.8%)	<0.001
Widowed	646 (10.3%)	6,179 (11.6%)	
Divorced/Separated	1,048 (16.6%)	7,903 (14.8%)	
Single/Domestic Partner Unknown	842 (13.4%) 178 (2.8%)	9,986 (18.7%) 2,213 (4.2%)	
<b>Type</b>			
I	5,154 (81.8%)	43,471 (81.5%)	0.07
II	454 (7.2%)	4,252 (8.0%)	
Other	695 (11.0%)	5,635 (10.6%)	



**Table 2: Rural-Urban Differences in Node Examination among Surgical Patients**

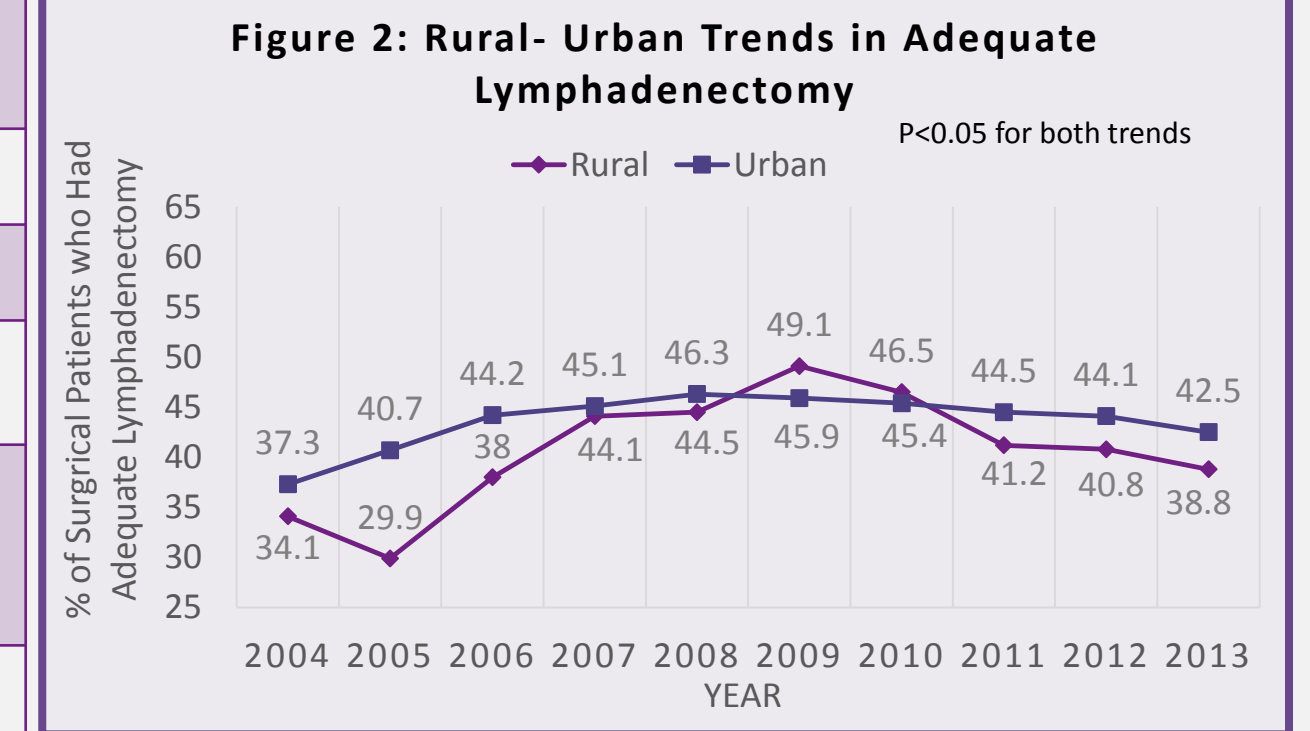
	Rural (n=6,164)	Urban (n=52,280)	P-value
<b>All Patients</b>			
Nodes Examined, Yes†	4,096 (66.5%)	35,874 (68.6%)	<0.001
Number of nodes examined, median‡	7	8	<0.001
<b>Lymphadenectomy†</b>			
None	2,068 (33.6%)	16,406 (31.4%)	<0.001
Inadequate	1,416 (23.0%)	11,768 (22.5%)	
Adequate	2,680 (43.5%)	24,106 (46.1%)	
<b>Type I</b>	<b>Rural (n=5,069)</b>	<b>Urban (n=42,838)</b>	
Nodes Examined, Yes†	3,283 (64.8%)	28,580 (66.7%)	0.005
Median # of nodes examined ‡	6	7	<0.001
<b>Lymphadenectomy†</b>			
None	1,786 (35.2%)	14,248 (33.3%)	0.002
Inadequate	1,161 (22.9%)	9,544 (22.3%)	
Adequate	2,122 (41.9%)	19,036 (44.5%)	
<b>Type II</b>	<b>Rural (n=435)</b>	<b>Urban (n=4,072)</b>	
Nodes Examined, Yes†	321 (73.8%)	3,217 (79.0%)	0.01
Number of nodes examined, median‡	9	11	0.005
<b>Lymphadenectomy†</b>			
None	114 (26.2%)	855 (21.0%)	0.02
Inadequate	108 (24.8%)	986 (24.2%)	
Adequate	213 (49.0%)	2,231 (54.8%)	

† Chi-square analysis; ‡ Wilcoxon Rank Sum Test

**Table 3: Unadjusted and Adjusted Odds of Surgery, Node Examination, and Adequate Lymphadenectomy among Rural Patients**

	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
<b>All Cancers</b>		
Receipt of Surgery	0.91 (0.77-1.09)	0.81 (0.68-0.97)
Node Examination†	0.91 (0.86-0.96)	0.90 (0.85-0.95)
Receipt of Adequate Lymphadenectomy †	0.90 (0.85-0.95)	0.89 (0.84-0.94)
<b>Type I</b>		
Receipt of Surgery	0.90 (0.71-1.13)	0.80 (0.64-1.01)
Node Examination†	0.92 (0.86-0.97)	0.91 (0.86-0.97)
Receipt of Adequate Lymphadenectomy†	0.90 (0.85-0.96)	0.89 (0.84-0.95)
<b>Type II</b>		
Receipt of Surgery	1.01 (0.62-1.64)	0.92 (0.56-1.51)
Node Examination†	0.75 (0.60-0.94)	0.72 (0.57-0.90)
Receipt of Adequate Lymphadenectomy†	0.79 (0.65-0.97)	0.75 (0.62-0.92)

† Among those who had surgery; Urban patients are the reference group; adjusted models controlled for age, race/ethnicity, marital status, and year of diagnosis



## Discussion

### Key Findings:

- Regardless of endometrial cancer Type, rural patients were less likely to have any lymph nodes examined
- A smaller proportion of rural cancer patients had adequate lymphadenectomy
- While rates of adequate lymphadenectomy increased for both rural and urban women, rates remained higher for urban women
- Even after adjusting for important factors, rural women were less likely to have surgery, lymph node examination, and adequate lymphadenectomy

**Future research** should explore rural disparities in adjuvant therapy and survival.

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